

CLAIMS

What is claimed is:

1 A tire building drum having an axis, a center section and two end sections; 5 each end section is provided with an expandable bead lock assembly having a plurality of axially extending, circumferentially spaced-apart finger segments adapted for gripping a bead;

10 each of the finger segments being expandable from a first finger radius in a collapsed condition of the bead lock assembly to a second finger radius in a semi-expanded condition of the bead lock assembly and to a third finger radius in a fully expanded condition of the bead lock assembly.

15 2. The tire building drum of claim 1, wherein each bead lock assembly comprises: a carrier ring;

15 a plurality of radially expandable segments; and

15 a plurality of elongate links extending between the carrier ring and radially inner ends of the expandable segments;

15 wherein the finger segments are disposed at radially outer ends of the expandable segments; and

15 wherein axial movement of the carrier ring causes radial movement of the expandable segments and the finger elements.

20 3. The tire building drum of claim 2, further comprising:

20 a cylinder having a cylindrical piston portion;

20 a first piston disposed in the piston portion;

20 second piston disposed in the piston portion; and

25 at least one rod connecting the second piston to the carrier ring;

25 wherein axial movement of the second piston causes axial movement of the carrier ring.

25 4. The tire building drum of claim 3, further comprising:

25 at least one rod extending from the first piston through an end plate of the cylinder for limiting axial movement of the first piston.

30 5. The tire building drum of claim 4, further comprising:

30 pneumatic lines connecting to passageways within the cylinder;

wherein by selectively applying pressurized air in the pneumatic lines, the pistons can be moved axially within the piston portion of the cylinder.

6. The tire building drum of claim 5, wherein:

the first piston and the second piston are each generally in the form of flat discs, and both
5 are centered on the axis, and each has substantially the same outer diameter as the other.

7. The tire building drum of claim 6, wherein:

the first piston is disposed axially outward of the second piston.

8. The tire building drum of claim 1, wherein:

the center section is circumferentially segmented, having a plurality of elongate fixed
10 segments alternating with a like plurality of elongate expanding segments.

9. The tire building drum of claim 8, wherein:

the expanding segments are axially-extending and circumferentially spaced from one
another, and end portions of the expanding segments are contoured to have annular recesses
15 in their outer surfaces at positions corresponding to the positions of sidewall inserts which
will be applied to a tire carcass being laid up on the drum; and

each of the expanding segments is positioned at a first drum radius when the drum is
in the collapsed condition, at a second drum radius when the drum is in the semi-expanded
condition, and at a third drum radius when the drum is in the fully expanded condition.

10. The tire building drum of claim 9, wherein:

20 each of the finger segments is positioned at the first finger radius when the drum is in
the collapsed condition, to the second finger radius when the drum is in the semi-expanded
condition, and to the third finger radius when the drum is in the fully expanded condition.

11. The process of building a tire on a tire building drum having an expandable
center section and two expandable end sections, comprising the steps of:

25 (a) applying an innerliner on a flat application surface of the tire building drum while
the center section and the end sections are in their collapsed conditions;

(b) expanding both the center section and the end sections and to an intermediate
expanded condition to form a pair of spaced recesses on the center section of the drum;

(c) applying a pillar insert into each recess of the center section whereby the
30 application surface across the building drum is substantially flat;

(d) applying a first ply onto the substantially flat application surface, followed by
applying post inserts atop the first ply and substantially above the pillar insert, followed by

applying a second ply;

(e) moving a pair of beads into place above fingers of a bead lock assembly in each of the expandable end sections.

(f) expanding each the bead lock assembly and the center section to their fully-expanded positions so that the fingers grip the inextensible beads;

5 (g) turning up the innerliner, first ply and second ply about the beads;

(h) collapsing the bead lock assemblies and the center section to the collapsed position; and

(i) removing a completed green tire carcass from the drum.

10 12. The process of building a tire on a tire building drum having an expandable center section and two expandable end sections, comprising the steps of:

(a) applying an innerliner on a flat application surface of the tire building drum while the building drum and the end sections are in their collapsed, unexpanded conditions;

(b) expanding both the center section and the end sections and to their intermediate expanded conditions;

(c) applying pillar inserts followed by a first ply followed by post inserts followed by a second ply onto the center section;

(e) moving a pair of beads into place above a bead lock assembly in each of the expandable end sections.

20 (f) expanding each the bead lock assemblies and the center section to their fully-expanded positions so that the beads are secured in place;

(g) turning up the innerliner, first ply and second ply about the beads;

(h) collapsing the bead lock assemblies and the center section to the collapsed position; and

25 (i) removing a completed green tire carcass from the drum.

TOP SECRET - TIRE DRUM